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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.
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EXAMINER
[illegible]

ART UNIT	PAPER NUMBER
2811	

DATE MAILED: 06/10/99

Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner of Patents and Trademarks

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Office Action Summary	Application No. 08/958,568	Applicant(s) Ohtani et al.
	Examiner Shouxiang Hu	Group Art Unit 2811

☒ Responsive to communication(s) filed on *Apr 12, 1999* .

☐ This action is **FINAL**.

☐ Since this application is in condition for allowance except for formal matters, **prosecution as to the merits is closed** in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11; 453 O.G. 213.

A shortened statutory period for response to this action is set to expire *three* month(s), or thirty days, whichever is longer, from the mailing date of this communication. Failure to respond within the period for response will cause the application to become abandoned. (35 U.S.C. § 133). Extensions of time may be obtained under the provisions of 37 CFR 1.136(a).

Disposition of Claims

☒ Claim(s) *1-12* is/are pending in the application.

Of the above, claim(s) *7-12* is/are withdrawn from consideration.

☐ Claim(s) _____ is/are allowed.

☒ Claim(s) *1-6* is/are rejected.

☐ Claim(s) _____ is/are objected to.

☐ Claims _____ are subject to restriction or election requirement.

Application Papers

☒ See the attached Notice of Draftsperson's Patent Drawing Review, PTO-948.

☒ The drawing(s) filed on *Oct 28, 1997* is/are objected to by the Examiner.

☐ The proposed drawing correction, filed on _____ is ☐approved ☐disapproved.

☒ The specification is objected to by the Examiner.

☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. § 119

☒ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d).

☒ All ☐ Some* ☐ None of the CERTIFIED copies of the priority documents have been

☒ received.

☐ received in Application No. (Series Code/Serial Number) _____ .

☐ received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

*Certified copies not received: _____ .

☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).

Attachment(s)

☒ Notice of References Cited, PTO-892

☐ Information Disclosure Statement(s), PTO-1449, Paper No(s). _____

☐ Interview Summary, PTO-413

☒ Notice of Draftsperson's Patent Drawing Review, PTO-948

☐ Notice of Informal Patent Application, PTO-152

--- SEE OFFICE ACTION ON THE FOLLOWING PAGES ---

DETAILED ACTION

1. Figures 2A - 2F should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g).

2. The drawings 1 and 3-10 are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the structure of "top layer of interconnect metal formed over said gate electrode" called for in claims 1- 4 and the structure of "conductive interconnects formed in the same layer as said gate electrodes" called for in claims 5 - 6 must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

3. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

4. The following title is suggested: Semiconductor Device with Improved Interconnections.

5. Claims 1 - 6 are rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. The structure of "top layer of interconnect metal formed over said gate electrode " claimed in claims 1- 4 and the structure of "conductive interconnects formed in the same layer as said gate electrodes" claimed in claims 5 - 6 are not clearly described in the specification.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. Claims 1, 2 and 4 are also rejected under 35 U.S.C. 103(a) as being unpatentable over admitted prior art shown in Drawings 2A through 2F in view of Havemann.

The admitted prior art shows a semiconductor device which comprises a gate electrode; a gate insulator film wider than said gate electrode; an active layer; a pair of n- or p-type regions formed in said active layer; a pair of silicide layers self-aligned to said gate insulator film, said silicide layers consisting mainly of a metal material and silicon. For forming the silicide contacts, a metal layer is utilized, and then the unsilicided portions of the metal layer are fully removed. The interconnections are then formed through contact holes. The claimed structure differs from the admitted prior art in that it comprises a different type of interconnections, in which, as claimed, a first metallization layer is in intimate contact with the silicide layers, and the first metallization layer is made of same metal material as the one in the silicide layers. However, Havemann discloses a substantially similar type of interconnections for an integrated semiconductor device. Havemann's interconnection comprises a metallization layer made of unsilicided portions of a metal layer. This metallization layer is equivalent to the first metallization layer in the claimed invention as it is in direct contact to the self-aligned silicide

layers and it is made of the same metal material as the one in the silicide layers. Havemann also utilizes the metal layer to form the silicide layers; and further teaches the patterning of the unsilicided portions of the metal layer and inhibiting removal of the patterned potions of the metal layer, so that the pattern-protected metal layer can serve as part of desired interconnections. Therefore, it would have been obvious to one of ordinary skilled in the art at the time the invention was made to incorporate Havemann's interconnections into the admitted prior art because of following reasons: 1. Use of the first metallization layer would provide improved flexibility in placing the contact holes. 2. The direct contact between the first metallization layer and the silicide layers would result in improved electric contacts between them.

7. Claims 3, 5 and 6 are also rejected under 35 U.S.C. 103(a) as being unpatentable over the admitted prior art in view of Havemann as applied to claims 1, 2, and 4 above, and further in view of McDavid. The devices in claims 3, 5 and 6 differ from the devices in claims 1, 2 and 4 in that they further include a second metallization layer in intimate contact to the first metallization layer. McDavid discloses an interconnection layer having multiple metal layers with gold on the top for reducing interconnection resistance, See Fig. 1. McDavid is evidence that ordinary workers in the art of interconnection design would recognize the benefit of using multiple conductive layers for the interconnections. Hence, it would be obvious to one having ordinary skill in the art at the time the invention was made to include a second metallization layer in the interconnections for simply further reducing the interconnection resistance, as per the teaching of McDavid.

Conclusion

1. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Reference C is being cited since it shows some relevant interconnection structures.

2. **Papers related to this application may be submitted to Technology center (TC) 2800 by facsimile transmission. Papers should be faxed to TC 2800 via the TC 2800 Fax center located in Crystal Plaza 4, room 4-C23. The faxing of such papers must conform with the notice published in the Official Gazette, 1096 OG 30 (November 15, 1989). The Group 2811 Fax Center number is (703) 308-7722 and 308-7724. The Group 2811 Fax Center is to be used only for papers related to Group 2811 applications.**

Any inquiry concerning this communication or any earlier communication from the Examiner should be directed to *Shouxiang Hu* whose telephone number is **(703) 308-2772**. The Examiner is in the Office generally between the hours of 8:30AM to 5:00PM (Eastern Standard Time) Monday through Friday.

Any inquiry of a general nature or relating to the status of this application should be directed to the **Technology Center Receptionists** whose telephone number is **308-0956**

Tom Thomas
Supervisory Patent Examiner
Technology Center 2800